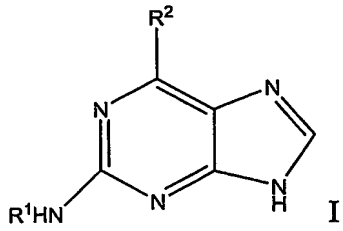
WHAT IS CLAIMED IS:

1. A compound of Formula I having the following structure:



I

wherein:

R^1 is a member selected from the group consisting of hydrogen, C_{1-4}alkyl, C_{3-8}cycloalkyl and C_{0-2}alkylaryl, substituted with 0-2 R^{1a} groups that are independently selected from the group consisting of halogen, C_{1-4}alkyl, C_{1-4}alkoxy, -N(R^{1b}, R^{1b}), -SO_2N(R^{1b}, R^{1b}), -C(O)N(R^{1b}, R^{1b}) and -O-aryl, or when said R^{1a} groups are on adjacent ring atoms they are optionally taken together to form a member selected from the group consisting of -O-$(CH_2)_{1-2}$-O-, -O-$C(CH_3)_2CH_2$- and -$(CH_2)_{3-4}$-, or R^1 is optionally taken together with the nitrogen to which it is attached to form a heterocycle, optionally substituted with C_{1-4}alkyl, C_{3-8}cycloalkyl, C_{1-4}alkylhydroxy and C_{0-2}alkylaryl;

each R^{1b} group is a member that is independently selected from the group consisting of hydrogen and C_{1-4}alkyl;

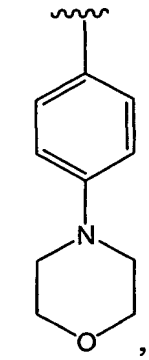
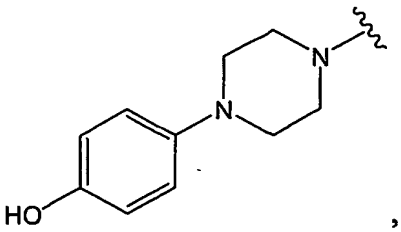
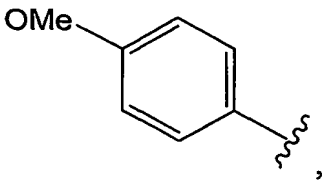
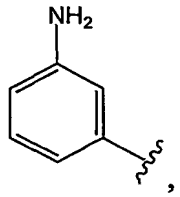
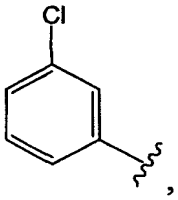
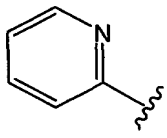
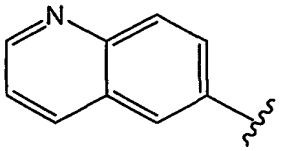
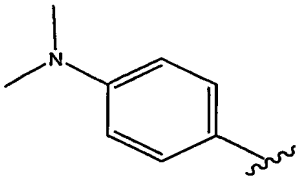
R^2 is a member selected from the group consisting of hydrogen, halogen and -L-R^3;

L is a member selected from the group consisting of -O-, -S- and -NR^4-, wherein R^4 is H, or R^4 is optionally taken together with R^3 and the nitrogen to which both are attached to form a heterocycle, optionally substituted with C_{1-4}alkyl;

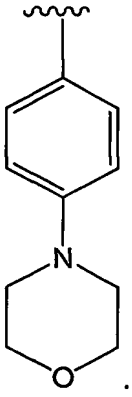
R^3 is a member selected from the group consisting of C_{1-4}alkyl, C_{3-8}cycloalkyl and C_{0-2}alkylaryl, substituted with 0-2 R^{3a} groups that are independently selected from the group consisting of halogen, C_{1-4}alkyl, C_{1-4}alkoxy, -N(R^{3b}, R^{3b}), -SO_2N(R^{3b}, R^{3b}), -C(O)N(R^{3b}, R^{3b}) and -O-aryl, or when said R^{3a} groups are on adjacent ring atoms they are optionally taken together to form a member selected from the group consisting of -O-$(CH_2)_{1-2}$-O-, -O-$C(CH_3)_2CH_2$- and -$(CH_2)_{3-4}$-; and

each R^{3b} group is a member that is independently selected from the group consisting of hydrogen and C_{1-4}alkyl.

2. The compound of claim 1, wherein R^1 is a member selected from the group consisting of:


,

,

,

,

,

, and

.


1 3. The compound of claim 2, wherein R^1 is C_{0-2}alkylaryl, substituted with
2 -N(R^{1b}, R^{1b}).

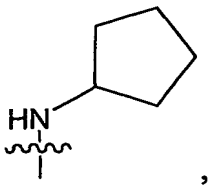
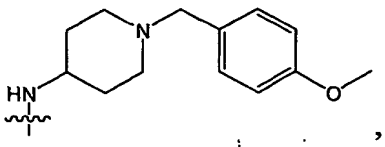
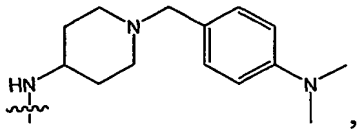
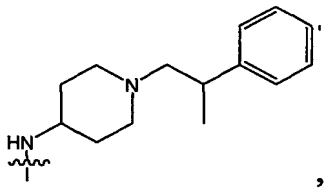
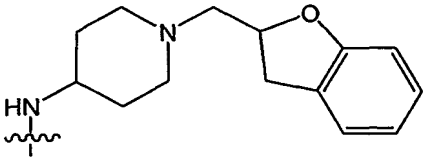
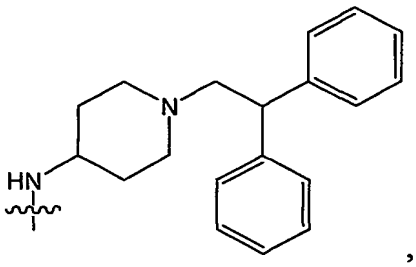
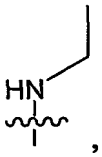
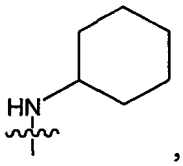
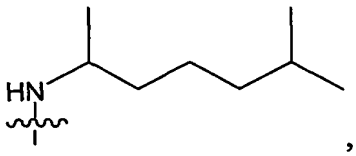
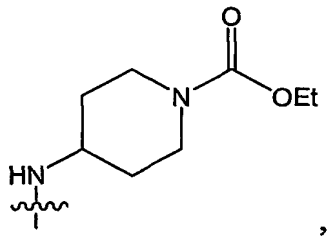
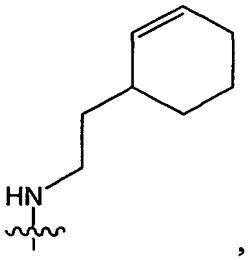
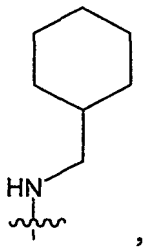
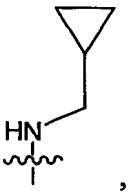
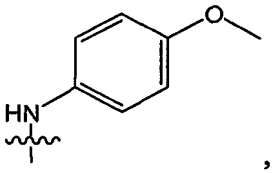
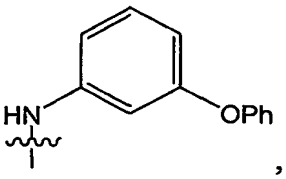
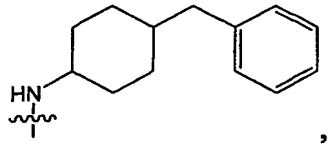
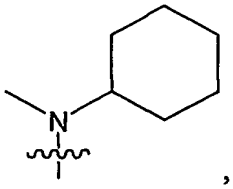
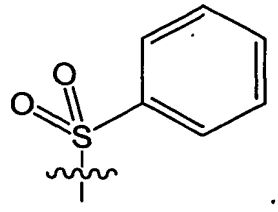
1 4. The compound of claim 3, wherein R^1 is

2 .

1 5. The compound of claim 1, wherein R^2 is -L-R^3.

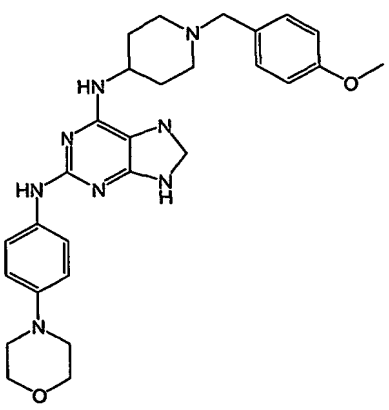
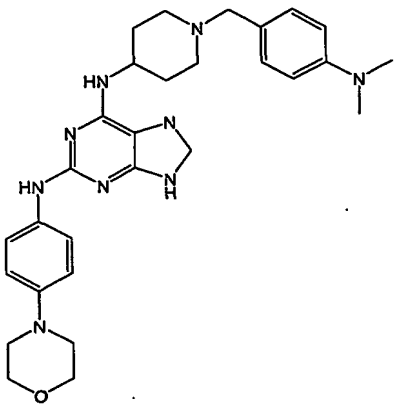
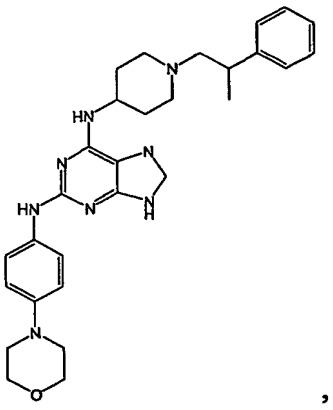
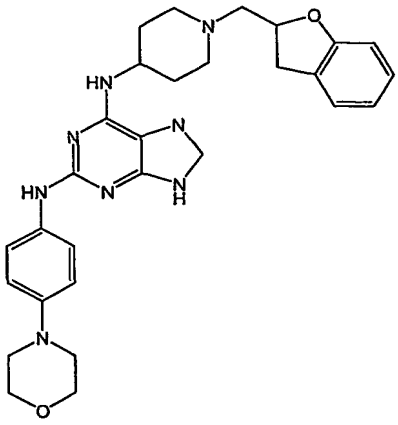
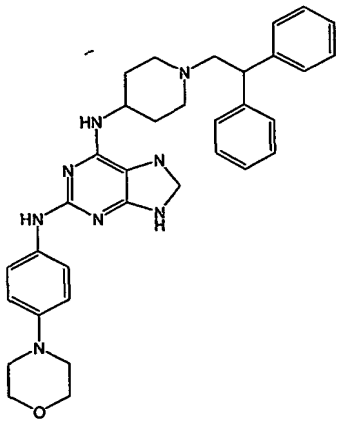
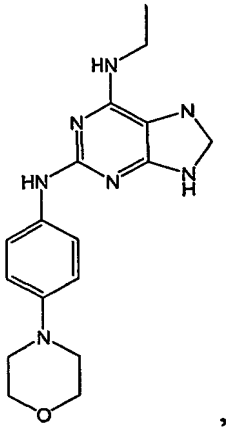
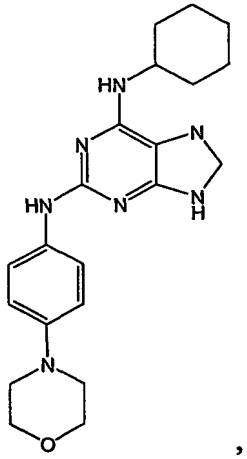
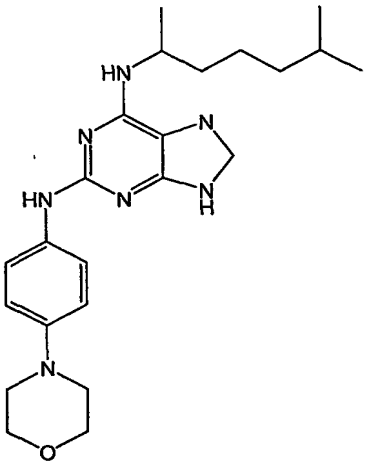
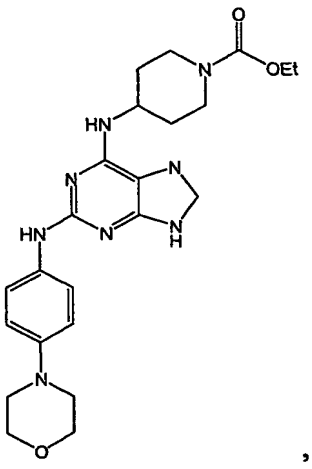
1 6. The compound of claim 5, wherein L is -NR^4-, wherein R^4 is
2 hydrogen, and R^3 is C_{3-8}cycloalkyl.

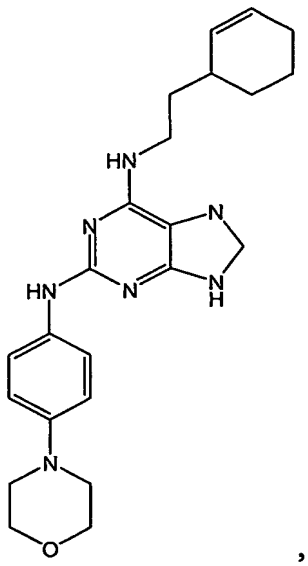
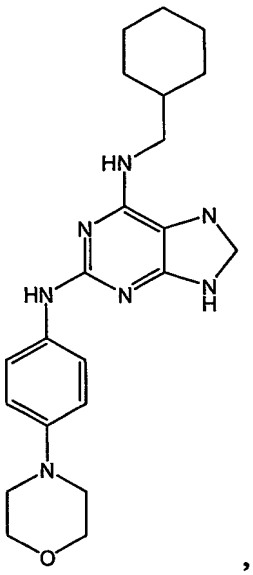
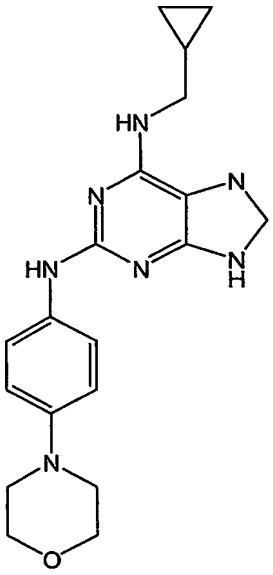
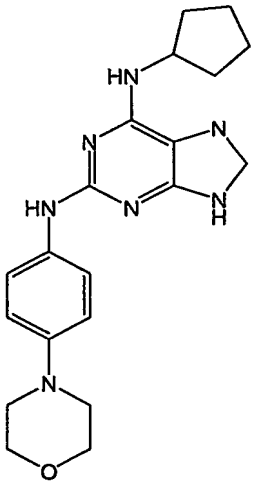
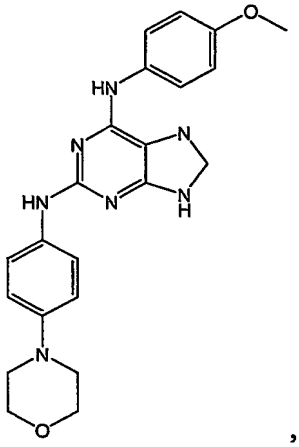
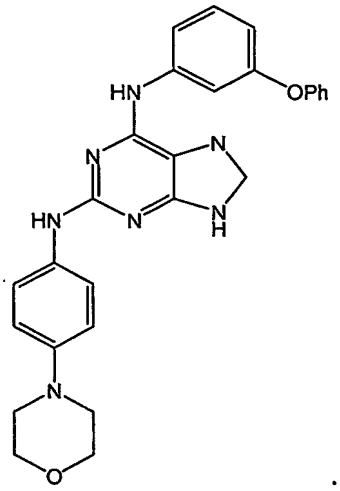
1 7. The compound of claim 6, wherein R^3 is cyclohexyl.

8. The compound of claim 1, wherein R^2 is a member selected from the group consisting of:

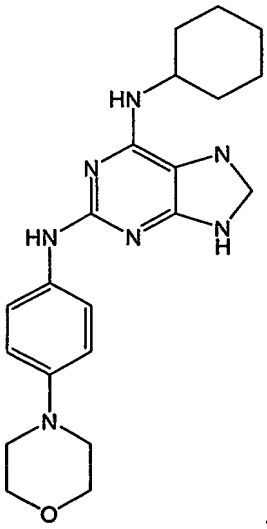

















, and


9. The compound of claim 1, wherein said compound is a member selected from the group consisting of:


,

,

,

,

,

,

,

,

,


,

,

,

,

, and

.

1 10. The compound of claim 1, wherein the compound is:



2 .

11. A pharmaceutical composition comprising a compound of claim 1 and a pharmaceutically acceptable carrier.

12. A method of inducing dedifferentiation of a lineage committed cell, the method comprising:

contacting a lineage committed mammalian cell with a compound of claim 1, whereby the mammalian cell dedifferentiates into a multipotent stem cell.

13. The method of claim 12, further comprising detecting dedifferentiation of the mammalian cell into a multipotent stem cell.

14. The method of claim 12, whereby differentiation of the lineage committed mammalian cell into a multipotent stem cell is detected by detecting loss of expression of a marker gene expressed by the lineage committed mammalian cell.

15. The method of claim 14, wherein said lineage committed cell is a myoblast cell.

16. The method of claim 15, wherein the marker gene is a member selected from the group consisting of: MyoD, Myf5, myosin, CD56 and desmin.

17. The method of claim 15, wherein the myoblast cell is isolated from a mouse.

18. The method of claim 15, wherein the myoblast cell is isolated from a primate.

19. The method of claim 18, wherein the primate is a human.

20. A method of identifying compounds that induce dedifferentiation of lineage committed mammalian cells into multipotent stem cells, said method comprising

(a) contacting a mammalian cell with a test compound suspected of inducing dedifferentiation of lineage committed mammalian cells;

(b) culturing said cells in a first cell culture media, wherein the first cell culture media induces differentiation of the multipotent stem cell into a first cell type;

(c) culturing said cells in a second cell culture media, wherein the second cell culture media induces differentiation of the multipotent stem cell into a second cell type;

(d) determining whether the cells have undergone differentiation into the first or second cell type, wherein induction of differentiation into both the first cell type an the second cell type identifies the test compound as a compound that induces dedifferentiation of lineage committed mammalian cells.

21. The method of claim 20, wherein the first cell culture medium induces osteogenesis and the second culture medium induces adipogenesis,

and wherein the first cell type is an osteoblast and the second cell type is an adipocyte.

22. The method of claim 20, wherein the test compound is a member selected from the group consisting of: substituted purines, pyrimidines, quinazolines, pyrazines, pyrrolopyrimidine, pyrazolopyrimidine, phthalazines, pyridazines, and quinoxalines.

23. The method of claim 20, wherein the test compound is a 2,6 disubstituted purine

24. The method of claim 21, wherein induction of osteogenesis is detected by detecting expression of an osteogenesis marker gene.

25. The method of claim 21, wherein induction of adipogenesis is detected by detecting expression of an adipogenesis marker gene.

26. The method of claim 24, wherein the osteogenesis marker gene is selected from the group consisting of: alkaline phosphatase, collagen type I, osteocalcin, and osteoponin.

27. The method of claim 25, wherein the adipogenesis marker gene is selected from the group consisting of: ob, Ucp, PPARγ and C/EBPs.

28. A method of treating a bone disorder, the method comprising:

(a) contacting a mammalian cell with a compound of claim 1, whereby the mammalian cell dedifferentiates into a multipotent stem cell; and

(b) contacting the multipotent stem cell with a cell culture medium that induces differentiation of the multipotent stem cell into a cell of an osteoblast lineage; and

(c) administering the cell of an osteoblast lineage to an individual with the disorder, thereby treating the disorder..

29. The method of claim 28, wherein the bone disorder is associated with defective osteoblasts.

30. The method of claim 28, wherein the administration is by surgical implantation.

31. The method of claim 28, wherein the mammalian cell is attached to a solid support.

32. The method of claim 29, wherein the bone disorder is osteoporosis.

33. The method of claim 31, wherein the solid support is a three dimensional matrix.

34. The method of claim 31, wherein the solid support is a planar surface.